part of the gases could be easily detected. No action whatever was observed, although the substances were left in contact for two months. A further experiment showed that, as was to be expected, very dry air undergoes electromerism when subjected to the action of radium. Two more tubes were then set up, similar to the first, containing mixtures of carbon monoxide and oxygen, one very dry and the other containing traces of moisture, and although the radium bromide was in contact with them for more than three months, not the slightest contraction could be observed. In these cases, therefore, electromerism produces no chemical change.

There was, however, a possibility that electromerism might bring about a chemical action in a mixture of gases which was under conditions which were nearly, but not quite, suitable for chemical action to take place. The gaseous mixtures mentioned only combine, even when moist, at a red heat. Since the experiments were done at 20°, they only show that electromerism does not produce chemical action in gases which are otherwise unable to combine.

There remained the possibility that if gases were just on the point of combining, increasing the electromerism might accelerate the rate of action. I sought for a case of simple chemical union which would proceed at a manageable temperature, and at a rate which could be measured. Of those tried, the reaction between hydrogen and nitrous oxide was found to be the most suitable. The gases used were as pure as possible, but dried only by passing through phosphorus pentoxide tubes. They were found to combine with great uniformity when heated in clean Jena glass tubes to 530°. An electric resistance furnace was used, consisting of a wide silica tube which formed the heated chamber. It is known that many substances when heated produce electromers in a gas; lime is fairly efficient, thoria more so, and, of course, radium bromide most of all. In the first experiment two tubes of the same Jena glass, containing the hydrogen and nitrous oxide mixture, were heated side by side. One contained some lime, and in order to make the conditions as similar as possible an equal quantity of powdered Jena glass was introduced into the other. As soon as the requisite temperature was reached, the action proceeded rapidly in the tube containing lime, the rate in the first five minutes being five times the rate of combination in the tube containing only powdered glass. After fifteen minutes the second tube had caught up the first, and the rates of union were equal up to the completion of the action. With thoria the effect was still more marked, the rate increasing to twenty times the rate in the tube containing the glass. Finally, about 2 mg. of radium bromide was heated in the mixture of gases. As soon as the combining temperature was reached, the gases in the radium bromide tube exploded.

From these three experiments it is seen that, as the amount of electromerism was increased, there was a rapid increase in chemical action.

I have recently been able to show that if the union of carbon monoxide and oxygen takes place in a strong electric field, which has the effect of removing electromers, the chemical action is diminished. Similar experiments are in progress with the mixture of hydrogen and chlorine, combining under the influence of light.

The next experiment tried illustrates one way in which the electromerism of a gas may bring about chemical change. Hydrogen sulphide and sulphur dioxide can be mixed at the ordinary temperature in presence of traces of moisture, but in presence of liquid water decomposition takes place into sulphur and water. The gases were dried before mixing by calcium chloride, which leaves about 4 mg. of water vapour per litre in the gas. After mixing, a small open silica tube containing about 2 mg. of dried radium bromide was introduced. After six hours no apparent change had taken place in the gas; there was no deposit of sulphur on the sides of the jar, and it seemed at first as if no action had been produced. On opening the jar, however, an inrush of air was noticed, and the contents were almost odourless. On heating the radium tube a large quantity of water was driven off, and a copious sublimate of sulphur was seen. The whole of the gaseous contents of the jar had condensed in the small tube containing the radium bromide. The explanation of this action of radium bromide is probably simple. Water vapour condenses on the electromers emitted, liquid drops are formed, and in them the chemical action takes place.[1]

Prof. Townsend has recently published an account of some experiments in which he has shown that there is a very marked decrease in the mobility of negative electromers in the presence of an amount of water vapour represented by a pressure of 1/10th mm. The air, in his experiments, was subjected to the action of Röntgen rays.

It is concluded that water in a form approaching to that of a drop is condensed on the electron even when a very small quantity is present. If this deposition of water molecules on electromers goes on when the amount of water present is still smaller, the theory of Sir J. J. Thomson affords a satisfactory explanation of the influence of moisture on chemical change, since some electromers are always present in ordinary gases.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE *Lancet* states that the University of Bristol is to receive the sum of 1000*l.* from the estate of the late Miss J. L. Woodward for the foundation of a scholarship in music or botany, to be known as the "Vincent Stuckey Lean Scholarship."

IT is proposed that the Congress of the Universities of the Empire shall be held in London in June, 1912, and a meeting of the Vice-Chancellors of the British universities is to take place in November next with the object of drawing up a provisional scheme of subjects to be discussed at the congress, which scheme will then be submitted to the overseas universities for suggestions.

AN Institute of Colonial Medicine has been established in connection with the faculty of medicine of the University of Paris. The first session will begin on October 13 and end at the close of the year. The following courses of instruction are announced:—Technical bacteriology and hæmatology, by Prof. Roger; parasitology, by Prof. Blanchard; surgery in tropical countries, by Dr. Morestin; ophthalmic affections, by Dr. Lapersonne; general epidemiology, by Prof. Chantemesse; tropical pathology and tropical hygiene, by Dr. Wurtz; and dermatology, by Prof. Gaucher in collaboration with Dr. Jeanselme.

ATTENTION has been directed here from time to time to the movement in this country to establish universities in China. We learn from the *Times* of September 13 that the success of the proposed Hong Kong University seems assured. Sir Frederick Lugard, the Governor of Hong Kong, has taken a prominent part in demonstrating the advantages likely to accrue from the undertaking, and he has been generously assisted by large contributions from the leading Chinese and others in the colony. Sir Hormusji Mody has offered to erect the buildings, whatever their cost (estimated at about 30,000*l.*), in accordance with the approved plans. Dr. Ho Kai, C.M.G., has given 18,000*l.*; Mr. J. H. Scott, senior partner of Messrs. Butterfield and Swire, has announced a gift of 40,000*l.* on behalf of his own and allied firms; and the Central Government at Peking has sent a substantial contribution. The bare minimum sum required has now been practically raised, and Sir Frederick Lugard and his helpers are appealing to the British public for the amount required to make the University worthy of British prestige. It may be pointed out that though there is no antagonism between them, there is no connection between this scheme and that associated with Oxford and Cambridge for the establishment of a university at Hankau, on the Yang-tsze.

THE annual meeting of the Institution of Mining Engineers was held at the University College, Nottingham, last week. In welcoming the members, Sir Joseph Bright, chairman of the council of the college, said they hoped in the near future to establish a chair of mining

[1] I have invariably noticed that water collects in tubes containing radium preparations exposed to undried air. The salts are not at all deliquescent, the crystals appearing quite sharp-edged under the microscope. I found that 10 mg. of radium bromide exposed to an atmosphere saturated at 0° for two days caused a deposition of water on its surface weighing 1·5 mg.

engineering at the college. A paper was read at the meeting by Prof. H. Louis on the Mining School at Bochum, Westphalia, in the course of which he said that in Germany there are schools devoted to the better education of miners and the elementary training of colliery officials. The course lasts two years, and the men attend for eight hours weekly for a year and a half, and for ten hours weekly during the last six months. It cannot, he said, be imagined that the Germans would have continued those institutions for nearly a century had they not found that it paid them to do so. Surely it is high time to abandon our insular policy of not profiting by the experience of our neighbours in matters of such vital importance. In Prof. Louis's opinion it would be easy enough for the various British coalfields to form miners' funds like that raised in Westphalia for the same purpose. Future legislation should, he suggested, enact that in any coalfield where a large majority—say two-thirds—of the producers decide to take advantage of its provisions power shall be given to constitute a fund, and a levy upon the entire output of the field should thus be legalised, the fund to be administered and applied very much as the Westphalian miners' fund has been.

An examination of the calendars, prospectuses, and announcements of the London polytechnic institutions for the session which is now commencing serves to show how well the metropolitan area is provided with facilities for technical and scientific instruction. The encouragement which is extended by the authorities to the plan of giving a distinguishing character to the curricula of certain of these colleges is well brought out by an inspection of the announcements in connection with the winter's work at the Northampton Institute. We can only give a few examples. The classes in submarine cable work are being continued, and more advanced classes are projected in radio-telegraphy. The success of the pioneer courses in aëronautics given last winter has been so marked that the subject is being developed. The instruction in electroplating is being brought more into line with the actual requirements of the trade, and arrangements have been made to extend the advanced work in sight-testing and physiological optics. The South-Western Polytechnic at Chelsea continues to provide courses of study suited for a great variety of technological purposes, and also for university students. We notice from the calendar of the day work at this college that students are informed that those who enter for technical instruction should have received previously a sound English education, and should have acquired an elementary knowledge of mathematics and, if possible, of physics and chemistry. The courses are arranged to occupy three years. On entering the student states whether he wishes to be trained as a mechanical or electrical engineer, or as a consulting or industrial chemist. In any of these cases he has mapped out a complete course of study. Students who have completed a three years' course should be in a position to obtain situations in important industrial firms. Birkbeck College, too, continues its excellent work. The new calendar has again to point out that the usefulness of the college is curtailed by its limited accommodation, and its pressing need is for increased space. More spacious college buildings, with additional class-rooms and larger laboratories better adapted to modern requirements, would give a great stimulus to the work of the college and add to its public utility. We notice that 1293 students attended its classes last winter, and that about a quarter of them were women.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, September 12.—M. Bouchard in the chair.—J. **Guillaume** and J. **Merlin**: Occultation of η Geminorum by Venus, July 26, 1910, observed at Lyons. As the planet was only 9° above the horizon, the images observed were unsteady. The data are given in full, and calculations made of the diameter of Venus.—Carl **Störmer**: Theorems on the general equations of motion of a corpuscle in a magnetic and electric field superposed.—Paul **Floquet**: A comparison of the different methods of measuring the dielectric constant. Paraffin extracted from ozokerite has been shown by M. Malclès to possess no residual charge and to be without any appreciable conductivity. This paraffin has been utilised for comparing at the same instant the values of the dielectric constant obtained by two different static methods. The results agreed within 1 per cent., and a similar concordance was obtained for measurements based on the relative velocities in air and in paraffin of Hertzian waves.—Philippe **de Vilmorin**: Researches on Mendelian heredity.—J. **Athanasin** and J. **Dragoin**: The association of elastic and contractile elements in muscle.—E. **Roubaud**: The evolution of instinct in Vespides. Remarks on the social wasps of Africa, genus Belonogaster.—Joseph **Rousset**: The existence of three horizons of calcium phosphate in Algeria and Tunis.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), parts ii. and iii. for 1910, contain the following memoirs communicated to the society:—

February 26.—R. **König**: Conformal representation of the surface of a solid angle.—B. **Dürken**: The behaviour of the nervous system after extirpation of the limb-rudiments in the frog.—O. **Berg**: The Thomson effect in copper, iron, and platinum.

March 12.—Kurt **Wegener**: Aërological results obtained at the Samoa Observatory in 1909.

April 30.—R. **Fuchs**: Linear homogeneous differential equations of the second order with four essentially singular points.

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